



The Relationship Between Bank Credit Channel and Economic Growth in Türkiye: Analysis for the Period 2006: Q1-2021: Q2*

Türkiye’de Banka Kredi Kanalı ve Ekonomik Büyüme İlişkisi: 2006: Q1-2021: Q2 Dönemi Analizi

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Abstract

The impact of decisions taken by economic authorities on the overall outcome is theoretically explained by monetary transmission mechanisms. This study analyzes the functionality of the bank credit channel in the economy of Türkiye within the framework of monetary transmission mechanisms. The study uses the first quarter of 2006 and the second quarter of 2021 to both identify the immediate effects of the Covid-19 pandemic and to conduct analyses with robust data. Detailed econometric analyses are conducted within the framework of the SVAR (Structural Vector Autoregressive Model) model. In these analyzes, the effectiveness and reasons of the bank credit channel are comprehensively interpreted, and two models, Model I and Model II, are created. Model I attempts to demonstrate the functionality of the bank credit channel by identifying the relationship between credit, money supply, and growth, while Model II tests its relationship with inflation to determine the factor that triggers individual and commercial credits. The analysis results Show that the financial system in Türkiye rotates rapidly within itself, but reel growth and inflation are resilient to this cycle. It also reveals that the bank credit channel operates slowly and with a delay.

Öz

Ekonomi yönetimlerinin almış olduğu kararların toplam sonucu etkilemesi teorik anlamda parasal aktarım mekanizmaları ile açıklanmaktadır. Bu çalışmada da parasal aktarım mekanizmasının kredi kanalı çerçevesinde banka kredi kanalının işlerliği analiz edilmektedir. Yapılan araştırmada hem Covid-19 salgınının anlık etkilerinin tespit edilebilmesi hem de sağlıklı verilerle analiz yapılabilmesi amacıyla 2006 yılı birinci çeyrek ve 2021 yılı ikinci çeyrek dönemleri tercih edilmektedir. SVAR (Yapısal Vektör Otoregresif Model) modeli kapsamında detaylı analizler yapılmaktadır. Yapılan analizlerde banka kredi kanalının etkinliği ve nedenleri kapsamlı bir şekilde yorumlanarak Model-I ve Model-II olmak üzere iki model oluşturulmaktadır. Model-I’de kredi, para arzı ve büyüme arasındaki ilişki tespit edilerek banka kredi kanalının işlerliği ortaya konulmaya çalışılırken Model-II’de bireysel ve ticari kredileri tetikleyen faktörün belirlenmesi için enflasyonla olan ilişkisi test edilmektedir. Analiz sonuçları Türkiye’de finansal sistemin kendi içinde hızlı döndüğünü ancak reel

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büyümenin ve enflasyonun bu döngüye karşı dirençli olduğunu göstermektedir. Banka kredi kanalının da ağır ve gecikmeli olarak çalıştığını ortaya koymaktadır.

1. INTRODUCTION

Countries set targets for growth, employment, and price stability through monetary policies, using multiple tools that may change over time. It is crucial for economic management to understand these changes since they affect GDP through transmission mechanisms. From a historical perspective, transformations beginning in the 1980s, especially in finance, increased the importance of monetary policies and transmission mechanisms. Studies by Bernanke and Blinder, Suzuki, Sims, Taylor, and Mishkin continue to shed light on this field.

Earlier research (Taylor, 1995; Angeloni, Kashyap, Mojon and Terlizzet, 2003; Yue and Zhou, 2007) focused mainly on the interest channel, but over time other channels such as exchange rate, credit, asset prices, expectations, stock, and liquidity have also been examined. These studies provided insights into national economic structures and benefits for shaping the future, guiding central banks and governments in policy decisions.

The oldest and most traditional monetary transmission mechanism is the interest rate channel. This channel is also referred to as the Keynesian effect or the money channel. According to the interest rate channel, the increase in real interest rates resulting from tight monetary policy will increase the costs for businesses, thus reducing inventories and investments. The decrease in investment will lead to a decline in aggregate demand, resulting in a decrease in aggregate production (Mishkin, 1995: 4). The exchange rate channel, which arises from the impact of exchange rates on economic equilibria, is important because it affects supply and demand. The exchange rate channel, which arises from the impact of exchange rates on economic equilibrium, is important because it affects supply and demand. For example, a decrease in domestic real interest rates as a result of an expansionary monetary policy will make foreign deposits more attractive compared to domestic deposits. This decrease, which will also accelerate capital outflows, will devalue the domestic currency. As domestic goods become cheaper compared to foreign goods, net exports will increase (Horváth and Maino, 2006: 4; Mishkin, 1995: 5). The fact that stock prices are also affected by this process points to the asset price channel. An expansionary monetary policy will cause a decrease in interest rates, while at the same time making bonds less attractive compared to stocks and increasing demand for stocks. This is because higher stock prices will lead to higher investment spending, thereby increasing national income (Mishkin, 2001: 2).

Another monetary transmission mechanism channel, which is the subject of this study, is the bank credit channel. It is emphasized that the credit channel is not an alternative channel independent of the traditional monetary transmission mechanism, the interest rate channel, but rather a factor that strengthens and increases the effect of this channel. Therefore, it has been emphasized that the credit channel mechanism is actually a development or diffusion mechanism (Bernanke and Gertler, 1995: 28-29).

This study investigates whether growth in Türkiye occurred through the credit channel. This study, covering the period between the first quarter of 2006 and second quarters of 2021, examines both the functionality of the bank credit channel transmission mechanism during

the specified period and the immediate effects of Covid-19 using robust data. Significant steps have been taken in Türkiye to address this pandemic that has affected the entire world.

In Türkiye, steps have been taken to strengthen the monetary transmission mechanism in order to mitigate the negative effects of Covid-19. These steps include supporting liquidity in the domestic government bond market, increasing flexibility in banks' liquidity management, and expanding the scope of credit flows to the real sector (CBRT, 2020a: 1-2). Due to the continuation of the pandemic and the damage it caused globally, further decisions were made in 2020 and 2021. However, these decisions were primarily aimed at ensuring the uninterrupted operation of the credit channel and the healthy functioning of cash flows for the real sector. Thanks to the implemented credit campaigns, households were able to borrow for consumer and housing loans, filling the liquidity gap they experienced due to income loss. For the real sector, whose commercial activities and incomes significantly decreased, it acted as a buffer (CBRT, 2020b: 41).

The analysis conducted within this scope consists of two models: Model-I examines the bank credit channel with variables such as growth rate, M2 money supply, interest rate, credit, and velocity of money circulation (V2); Model-II examines the causality between credit and inflation (CPI) to support and complement the findings. Both the wide time span and the creation of a second model to determine the presence of the main factor triggering credit differentiate this study from others. It also contributes to the literature by offering a different perspective.

2. THEORETICAL BACKGROUND

While there are multiple avenues for monetary transmission, the bank lending channel holds particular significance in bank-based financial systems. This channel suggests that monetary policy directly influences the supply of bank loans, which in turn affects the investment and consumption possibilities of credit-dependent agents. Given the central role of banks in Türkiye's financial architecture, analyzing the responsiveness of credit volume to policy shocks is vital for evaluating the overall effectiveness of monetary interventions.

2.1. Monetary Transmission Channel

A review of the literature reveals numerous definitions aimed at highlighting the function and importance of the monetary transmission mechanism. This is because it allows for the different effects and changes in the national economy resulting from the tools used for monetary policy implementation. Central banks choose the most effective policy they can implement, taking into account the economic conditions they are in, and strive to achieve their future goals. To achieve the expected outcome from the policies they implement, they also utilize the existence of monetary transmission mechanisms.

The process by which inflation expectations, the inflation rate, and aggregate demand are affected by monetary policy decisions is generally referred to as the monetary policy transmission mechanism (Pétursson, 2001: 2). Since the 1980s, in order to measure the impact of monetary policies on the economy and to transparently communicate assessments of these policies to the public, careful attention has been paid to their effects on output gap, inflation, and aggregate demand, as well as the channels through which these effects occur (CBRT, 2013: 2).

The monetary transmission mechanism affects national income through various channels and variables. Identifying these transmission channels is crucial because it plays a significant role in developing the most effective set of policy tools, determining the timing of policy changes, and identifying the constraints central banks face when making decisions.

The monetary transmission mechanism consists of two stages. The first stage is the diffusion of changes in monetary policy through the financial system. This stage explains how changes in central bank market operations are transmitted to the bond market and the bank lending market. The second stage involves the diffusion of monetary policy shocks from the financial system to the real economy. That is, it explains how monetary policy shocks affect real production and aggregate prices (Pétursson, 2001: 2).

The channels that operate through the transmission mechanism are the traditional interest rate channel, the other asset price channel, the exchange rate channel, and the credit channel. This study focuses on and interprets in detail the importance of the bank credit channel.

2.2. Bank Credit Channel

The credit channel gives fund providers responsibility in accessing and evaluating information, highlighting adverse selection from asymmetric information and market failures leading to moral hazard. For financial intermediaries to operate effectively, they must make correct and careful choices, since policy implementers intervene in markets through them. Movements in interest rates affect credit supply and demand, creating variability in total output and demand.

The bank credit channel indicates that banks play a special role in solving market imperfections such as transaction costs and asymmetric information problems in credit markets. For this reason, it is very important for banks to be included in the financial system in order to solve incomplete information and to meet the demands of some economic units that request loans. Otherwise, those who request a loan will not be able to find a suitable financial instrument for their requests and will not be able to access the credit market. Assuming loans and securities on banks' balance sheets are not perfect substitutes, the choice between them enables the monetary transmission mechanism to function effectively through the bank loan channel (Mishkin, 1996: 9). Bernanke and Blinder (1988), using the IS/LM model, incorporated loans alongside money and bonds, treating them as perfect substitutes and suggesting that borrowers and lenders choose between the two based on interest rates.

Given the diversity of borrowers, monetary policies generate varying effects. Large firms can raise funds through stocks and bonds, while small firms depend heavily on bank credit or capital market funds and are more adversely affected by policies restricting deposits and reserves. Thus, under monetary contraction, the bank credit channel operates as illustrated in Table 1.

Table 1: Bank Credit Channel

Money Supply (M)	Bank Deposits	Bank Credits	Investment (I)	National Income (Y)
↓	↓	↓	↓	↓

Source: (Mishkin, 1995: 7)

As shown in Table 1, contractionary monetary policy reduces the money supply, leading to lower deposits and reserves. Consequently, banks restrict credit, investments decline, and national income falls.

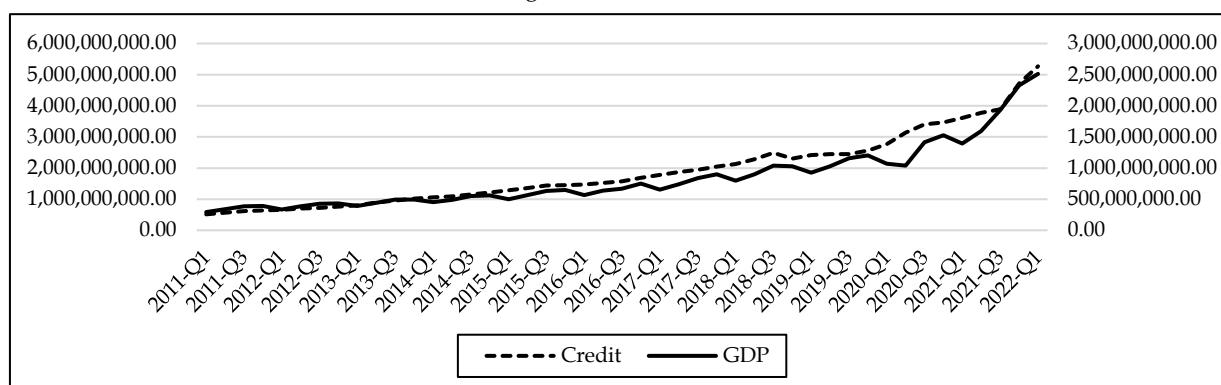
This study examines how monetary policy and the transmission mechanism functioned during the period under investigation. Between 2006 and 2021, the Central Bank of Türkiye (CBRT) set price stability as its primary objective in formulating monetary policy targets. To achieve price stability, it used short-term interest rates as a tool. Thus, it decided to continue the implicit inflation targeting and fiscal reform process that began in 2002. In 2006, it switched to explicit inflation targeting (CBRT, 2018b: 79). By 2008, the tight monetary policy implemented by the Central Bank, influenced by the global financial crisis that emerged in the US, began to reduce the volume of credit. Although the effects of the crisis eased towards the end of 2009, the fact that the problematic assets forming the background of the crisis had not yet been clarified and economic vulnerabilities persisted prevented the effective functioning of the credit mechanism (CBRT, 2009: 25; 2010: 27).

As a result of macroprudential measures and monetary policy changes implemented since 2010, and taking into account the base effect, financial indicators and credit have largely recovered. In September 2010, credit growth was 2.4% year-on-year in the Eurozone and 0.6% in the US, while it reached 26.5% in Türkiye (CBRT, 2014: 33; CBRT, 2010: 9,26). The asymmetric interest rate corridor, implemented towards the end of 2010, served as an active monetary policy tool. This tool aimed to control both credit and the exchange rate by adjusting money positions on a daily and weekly basis. Simultaneously, reserve requirements were gradually increased to curb the accelerating increase in credit volume.

Between 2010 and 2016, commercial and corporate loans were predominantly disbursed (Banking Regulation and Supervision Agency [BRSA, 2017: 11, 14). Credit growth, which began in late 2016, continued in 2017 (CBRT, 2017: 35). However, the rate of credit growth slowed in 2018 (CBRT, 2018a: 47). Towards the middle of 2018, rising inflation expectations led to price increases, and in addition, deteriorating core inflation indicators prompted the Central Bank to maintain its tight monetary policy stance (CBRT, 2018c: 4). This tight monetary policy continued into 2019 (CBRT, 2019: 23). The coronavirus pandemic in 2020 began to disrupt economic life, and to mitigate this negative impact, public banks were made more active. Simultaneously, the active ratio requirement was implemented.

The existence of the relationship between Türkiye's credit and GDP volumes is shown with the help of Figure 1.

Figure 1: Credit and GDP



Source: (Central Bank of Türkiye Republic [CBRT], 2023a)¹

In the Financial Stability Report published in May 2021, it was stated that the total credit increase of the real sector in September 2020 reached 25 percent. In addition, personal loans increased by 50 percent and commercial loans increased by 19 percent. The credit campaigns implemented within the scope of the measures taken against the epidemic caused a growth of 5.9 percent in the economy of Türkiye in the fourth quarter of 2020 and closed the total growth in 2020 with 1.8 percent. Although there were decreases in loan volumes with the tight monetary policy that started to be implemented as of the same quarter, the growth rate in the first quarter of 2021 was 7 percent. It has been stated that if the tight monetary policy implementation continues, the decline in the credit trend is expected to continue (CBRT, 2021b: 37-38; Statistical Institute of Türkiye [TURKSTAT], 2021a: 1-3; TURKSTAT, 2021b: 1).

Personal loans revived by mid-2021 as postponed individual demand emerged following the end of Covid-19 lockdowns. However, to mitigate inflationary pressures and external balance effects, measures were implemented to curb this demand. On the commercial side, rising input costs due to the Russia-Ukraine conflict increased corporate loan demand toward the end of 2021, leading into 2022 with accelerated commercial lending and a moderation in personal loans (CBRT, 2021a: 2; 2023b: 45).

When evaluated according to standard practices, the bank loan channel works as follows (Rabin and Yeager, 1997: 294):

- 1) The central bank enforces tight monetary policy through open market operations by reducing bank reserves,
- 2) With declining reserves, banks restrict credit supply to firms,
- 3) Credit-dependent companies cut back on investments and planned expenditures.

Table 1 illustrates the traditional functioning of the bank credit channel, yet it may also operate in reverse, requiring consideration of causality from growth to credit. This one-way relationship is explained by the 'supply-led' and 'demand-led' hypotheses.

According to the supply-led hypothesis, which assumes causality from financial development to growth, financial development positively affects economic growth. With market liberalization, diversification in financial markets transforms savings into investments,

¹ The table was created using the CBRT Electronic Data Distribution System.

accelerating this process and creating unidirectional causality from financial development to economic growth.

The supply-led hypothesis has two functions. First, financial development transfers resources from traditionally non-growth sectors to modern sectors and encourages entrepreneurs in modern sectors. In this case, economic growth will be achieved thanks to efficiency in resource allocation and increased productivity. Secondly, financial intermediation activities that transfer resources from traditional sectors will support the increase in the volume of funds in financial markets by collecting wealth and savings from these sectors in return for deposits and other financial obligations, or by creating credit and forcing them to save. The fact that these applications that support investments encourage economic growth is likened to Schumpeter's concept of innovation financing (Patrick, 1966: 175-176).

The first person to put forward the demand-led hypothesis was Robinson (1952), who put forward her view with the idea that "wherever the enterprise goes, finance follows." In other words, since the existence of situations requiring financial support is an opportunity, as economic growth occurs, these opportunities will develop financial markets, financial institutions and the financial system. As a result, with the increase in incomes as a result of economic growth, the demand for financial products and services will increase, causing a positive impact on the financial system (Robinson, 1952: 86; quoted in Ağazade and Karakaya, 2019: 474).

The demand-led hypothesis refers to the creation of financial services, financial assets and modern financial institutions in order to respond to the demands of investors and savers in the real sector. Therefore, the historical and evolutionary development of the financial system is the result of a country's widespread, comprehensive economic development (Patrick, 1966: 174). Accordingly, as the wealth levels and income scales of countries increase, their financial assets, financial institutions and financial markets, including their financial structures, become richer in parallel (Gurley and Shaw, 1967: 257). Rising demand from real sector growth stimulates the financial sector, expanding its products and services and fostering financial development.

The demand for financial services is inherently linked to the growth of real output and the commercialization and monetization of agriculture and other traditional livelihood sectors. The faster the growth rate of real national income, the more businesses will need external resources and financial intermediaries. Thus, the financial system will be able to support the locomotive sectors in the growth process (Patrick, 1966: 175).

Considering the monetary policies implemented by the countries, it is understood that the interactions between the two hypotheses explained above are high. However, it is particularly important that economic growth and financial development level have unidirectional causality.

Monetary transmission mechanisms, especially the bank credit channel, are a central research topic. Numerous studies on their effectiveness in Türkiye and abroad are reviewed and summarized in Table 2.

Table 2: Domestic and International Literature

Author	Findings
Bernanke and Blinder (1990)	In the study conducted to determine the functioning of the credit channel in the US economy, it was concluded that the bank credit channel was effective in the monetary transmission mechanism.
Kashyap and Stein (1997)	Another study conducted for the US economy found that monetary policy transmission provided strong support to the bank lending channel.
Romer and Romer (1993)	The study found that the disproportionate impact of tight monetary policy on banks' lending ability was largely attributable to the Fed's aim to reduce bank lending rather than the monetary transmission mechanism.
Kar and Pentecost (2000)	In the study conducted to determine the causality between financial development, including loans, and economic growth in Türkiye, it was determined that economic growth supported the development of the financial sector.
Suzuki (2004)	Three hypotheses were tested using a data set used in a study conducted for Japan. The results suggest that the credit channel operates through both the lending and balance sheet channels.
Kandır, İskenderoğlu and Önal (2007)	A study on Türkiye's economy shows that financial development, including credit, does not promote economic growth, but economic growth supports financial development.
Iacoviello and Minetti (2008)	In the study conducted to analyze the functioning of the credit channel in the economies of Finland, Germany, Norway and England, it was determined that the credit channel exists across the countries.
Ceylan and Durkaya (2010)	In the study investigating the causality relationship between economic growth and loans in Türkiye, a one-way causality from economic growth to loans was identified.
Sunde (2013)	A study of the Namibian economy attempted to identify the relationship between financial development, including credit, and economic growth. The findings suggest a unidirectional causality running from economic growth to financial development.
Arabacı and Baştürk (2013)	A structural VAR model was used in this study covering the period 2001:05-2008:05 for the Turkish economy. Based on the findings of the analysis, it was concluded that the bank credit channel worked for the Turkish economy during the examined period.
Murthy and Samantaraya (2014)	A study on India examined the relationship between economic activity and financial development using three indices. Results from the most comprehensive index indicate unidirectional causality from economic activity to financial growth.
Tunalı and Onuk (2017)	In the study conducted for Türkiye, where bank loans were considered as a variable, one-way causality from economic growth to financial development was identified.
Demirci (2017)	This study attempted to determine the relationship between the manufacturing sector and bank loans. The results suggest that the financial sector is shaped by the real sector.
Macit (2018)	The study analyzed the functioning of the credit channel in developing countries, focusing on E7 nations after the US Federal Reserve's post-2008 policy changes, and concluded that the bank credit channel was moderately effective in these countries.
Ismail, Ab-Rahim and Pei-Chin (2019)	A study on Malaysia found unidirectional causality from economic growth to financial development, including credit, underscoring the pivotal role of growth in fostering financial development.

Serel and Güvenoğlu (2019)	The findings of this study, which attempts to determine the effectiveness of the credit channel in Türkiye, indicate that the channel is functioning.
Can, Bocuoglu and Can (2020)	In this study covering the period 2006: Q1- 2018: Q2 for the Turkish economy, monetary transmission mechanisms were analyzed using the SVAR model. The findings indicate that monetary policy is effective and the bank credit channel is functioning in Türkiye.
Yurtkur and Yalçın (2020)	The study, covering the period from January 2011 to September 2018 for the Turkish economy, investigated the impact of monetary transmission mechanisms on the real economy. The study, which applied SVAR analysis, concluded that the credit channel is effective.
Şahbaz Kılınç and Kılınç (2020)	This study examined the impact of interest rate changes on private sector credit and aimed to assess the effectiveness of the bank lending channel. Impulse-response analyses confirmed that the channel was functioning effectively.
Li, Ni, Xu and Zhan (2021)	A study on the Chinese economy found the credit channel to be the most important monetary transmission mechanism, averaging 42 percent, though its influence declined over time.
Doğanalp (2022)	The study on the monetary transmission mechanism found the bank credit channel to be a highly significant channel for Türkiye's economy.
Bakkal (2022)	The study, conducted using SVAR analysis for the Turkish economy between 2010: Q1 and 2021: Q2, found that the bank credit channel is partially functional and plays a limited role in economic growth.

As can be seen from Table 2, the bank lending channel provides different causality findings. Each study contributes to the literature individually.

3. ECONOMETRIC ANALYSIS AND RESULTS

This section tested the validity of the bank credit channel, a monetary transmission mechanism in Türkiye's economy. Two complementary but distinct models, Model-I and Model-II, were employed for the analysis.

3.1. Aim and Method

In the analysis section of the study, the functionality of the bank credit channel was examined with quarterly data from the 2006-Q1 and 2021-Q2 periods of the economy of Türkiye. The reason why the starting year was chosen as 2006 is that the open inflation application was put into effect from this date. The beginning of 2021, when the economic effects of the Covid-19 pandemic were not yet felt starting from 2006, constitutes the analyzed period range.

In the analysis, two models were established: Model-I and Model-II. In Model-I, the relationship between money supply, credit and growth was tried to be determined. In Model-II established between credit and CPI, it is aimed to determine the effectiveness of the factors affecting the bank credit channel. In this context, evaluations were made within the framework of monetary policy developments.

Stationarity tests for both models showed that the variables satisfied the I(0) condition at level values, though with differing structures, leading to the adoption of the VAR (SVAR)

model. Both SVAR results and Granger causality analysis were evaluated together. Cointegration analysis was not performed as all variables were stationary at their level values.

The VAR model was established by Sims (1980) as a model where all variables are considered endogenous in order to overcome the estimation difficulties that may occur in large-scale econometric models. If the simple two-variable system is explained with the formula for the analysis to be made with the VAR model, equations (1) and (2) reflect these formulas (Enders, 1995: 294-295).

$$y_t = \alpha_{10} + \alpha_{11}y_{t-1} + \alpha_{12}z_{t-1} + \varepsilon_{1t} \quad (1)$$

$$z_t = \alpha_{20} + \alpha_{21}y_{t-1} + \alpha_{22}z_{t-1} + \varepsilon_{2t} \quad (2)$$

Since the coefficients in VAR models are difficult to interpret and the relationship between the variables is desired to be explained, impulse-response analysis, variance decomposition analysis or Granger causality analysis are helpful in this regard (Mert and Çağlar, 2019: 215).

After estimating the VAR model, the resulting residuals can be analyzed. Estimation of these residuals also provides the opportunity to interpret the future. With impulse response functions, it is possible to measure the effect of a one-unit standard deviation shock given to one variable on the other variable (Lütkepohl and Saikkonen, 1997: 127-157; Tari and Bozkurt, 2006: 5). Granger's study in 1969 is important for causality analysis between variables, too. In this study, Granger causality analysis presents some results regarding the direction of the relationships between variables and causality ties (Granger, 1969).

However, since VAR models do not include economic assumptions and constraints, the coefficients obtained from variance decomposition and impulse response functions do not yield clear results. To overcome this problem, Sims (1986) and Bernanke (1986) developed the Structural VAR (SVAR) model.

A SVAR model is a structural form of the VAR model and is defined in equation (3). (Pfaff, 2008: 4).

$$A y_t = A_1^* y_{t-1} + A_p^* y_{t-p} + B \varepsilon_t \quad (3)$$

In the SVAR model, just like in the VAR model, the economic interpretation of the obtained coefficients is quite difficult. To overcome this difficulty, structural variance decomposition and structural impulse response function analyses are performed.

3.2. Model (I)- Econometric Analysis

The variables of the analysis of Model-I, one of the two econometric models included in the study, are presented with the help of Table 3.

Table 3: Model-I Data Set

Variables	Symbol	Source
Real Gross Domestic Product (2009=100)	GROWTH RATE	TURKSTAT
Commercial (Opened in TL) (Current Data, %), Consumer Loan (Opened in TL) (Need+Car+House) (Current Data, %)	INTEREST	CBRT
Total Credits (Million TL)	CREDIT	BRSA
M2 Money Supply Adjusted for Exchange Rate Effect	M2	CBRT
Circulation Speed of Money	V2	TURKSTAT, CBRT

The selection of variables for the SVAR model to be analyzed was based on Mishkin's study conducted in 1996 (Mishkin, 1996). GDP data, which expresses total output, was preferred as the dependent variable and included in the model. The reason why it is preferred as a dependent variable is to try to determine how it is affected by monetary policy practices and the bank credit channel. In addition to Mishkin's study, the study conducted by Bernanke and Blinder in 1988 with the VAR model includes bank credit channel variables. In this model, variables such as bank reserves, bonds, loans, debts, deposits and required reserves are taken into account and grouped among themselves. Another study based on VAR models in the literature within the scope of the bank credit channel is Suzuki's study, and the econometric dimension is discussed with the data compiled from these studies.

The INTEREST variable in this study was obtained separately as the interest rates applied to individual and commercial loans due to their use as a monetary policy tool by the central bank. The reason interest rates were chosen as one of the key variables in the analysis is that they serve as a tool for controlling monetary policy.

The total credit variable took its place in the analysis because it is the basic data of the transfer mechanism, which is the main subject of the study. TL and FC data of the entire banking sector were used to obtain total credit data.

The reason why M2, which is another variable, is preferred is that it includes demand and time deposits created by banks as a result of the bankroll money creation mechanism. In addition, the fact that the expansionary or tightening nature of monetary policies is directly linked to the money supply makes it necessary to include this variable in the analysis.

In general, assuming other conditions remain constant, any increase in readily available purchasing power that people choose to hold will proportionally reduce the velocity of circulation, and vice versa (Marshall, 1923: 48). Including money in circulation within the bank credit channel analysis allows for a more comprehensive interpretation. Given the growing economic significance of monetary dynamics globally and in Türkiye, adding the V2 money velocity to the dataset distinguishes this study from previous research in the literature.

The variables' series and sources are as follows: GROWTH RATE was compiled as the chained quarterly GDP change, adjusted for seasonal and calendar effects, from TURKSTAT. INTEREST rates, obtained from CBRT's EVDS, combined commercial and consumer loans weighted by type, with quarterly changes calculated. M2 money supply was included as a notional amount index, adjusted for exchange rate effects, with quarterly changes computed using EVDS.

Quarterly total credit data were obtained from the Banking Regulation and Supervision Agency (BRSA)'s electronic database. The data were adjusted for exchange rate effects using the CBRT's dynamic method, converted to real terms with the CPI, and periodic change rates were calculated for the analysis.

The V2 variable was created by dividing the nominal GDP data obtained from TURKSTAT by the M2 money supply notional amount index obtained from EVDS. Quarterly change rates of the resulting series were found and included in the analysis.

At first, since traditional unit root tests do not take into account structural breaks in the series and lead to biased or misleading findings as a result of violating this assumption, a structural break unit root test was performed. In this study, the Zivot-Andrews unit root test, developed by Eric Zivot and Donald W. K. Andrews (1992), which can determine the presence of a single endogenous structural break in the series, was used. This test enables the stationarity analysis to produce more realistic results by identifying the break point from within the data. However, the structural unit root test performed does not indicate any break period; there is no unit root in the variables.

To determine the stationarity levels of the specified variables using traditional unit root tests, Philips-Perron (PP), Augmented Dickey-Fuller (ADF), and Kwiatkowski-Philips-Schmidt-Shin (KPSS) tests were applied. Philips-Perron test results show that all variables are stationary in the structure with constant, in the structure with constant and trend, and in the structure without constant and trend. The results obtained using the ADF test differ compared to the PP test. According to this test, all variables are stationary both in the structure with constant and in the structure with constant and trend. In constant and trendless structure, while all variables are stationary, only M2 is not stationary.

In the KPSS test, it was seen that all variables were both constant and stationary with a constant and trend structure.² Comparing the LM statistics with critical values led to the rejection of the hypothesis that the series contain unit roots.

After confirming variable stationarity with unit root tests, the optimal lag length for model estimation was set at 4. Subsequent overall stationarity analysis, shown in Figure 2, indicates that the model consists of stationary variables.

² See the Appendix for the results of all unit root tests.

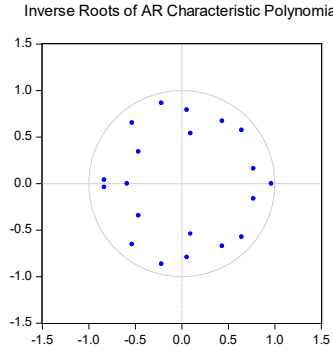
Figure 2. Model-I Inverse Roots of AR Polynomials

Figure 1 shows the stability of the model, as all characteristic roots are less than 1 and located within the unit circle. Subsequently, autocorrelation and heteroscedasticity tests were applied, with results summarized in Table 4.

Table 4: Model-I Autocorrelation (Lagrange Multipliers-LM) and Heteroscedasticity (White) Test Results

LM Test		
Delay Length	LM Statistik Value	Prob
1	22.45170	0.6141
2	29.52578	0.2472
3	34.43337	0.1020
4	35.40754	0.0837
White Test		
Chi-square	Df	Prob
578.4883	600	0.7288

As seen in Table 4, it was concluded that there was no autocorrelation among the error terms of the model for 4 lag levels and 0.05 significance levels. At the same time, it was investigated whether the variances of the error terms were constant for the whole model and it was determined that there was no heteroscedasticity problem in the model. As all significance tests indicated no issues, a Granger Causality Analysis and SVAR-Structural Analysis was conducted to examine the short-term causal relationships between the variables.

Table 5: Model-I Granger Causality Analysis Results (VAR Granger Causality/Block Exogeneity Wald Tests)

Dependent Variable: GROWTH RATE			
Independent	Chi-square	df	Prob
M2	15.52854	4	0.6141
V2	123.2537	4	0.2472
Dependent Variable: M2			
Independent	Chi-square	df	Prob
FAIZ	11.41260	4	0.0223
Dependent Variable: CREDIT			
Independent	Chi-square	df	Prob
GROWTH RATE	17.27960	4	0.0017
M2	10.51594	4	0.0326

According to the VAR-Granger causality analysis results in Table 5, at a significance level of 0.05, INTEREST RATE is a unidirectional cause of the M2 money supply. The M2 money supply, in turn, is a unidirectional cause of GROWTH RATE and CREDIT. Another variable exhibiting unidirectional causality towards the GROWTH RATE is the velocity of money (V2), while CREDIT is a variable that is a unidirectional cause of the GROWTH RATE.

Table 6: Model-I SVAR Structural Analysis Results

	INTEREST	M2	CREDIT	V2
INTEREST	1	0	0	0
M2	4.296690 (0.0000)	1	0	0
CREDIT	-0.702694 (0.4822)	-0.942503 (0.3459)	1	0
V2	-2.692265 (0.0071)	5.105668 (0.0000)	-2.628096 (0.0086)	1
GROWTH RATE	1.138091 (0.2551)	-0.961130 (0.3365)	0.402323 (0.6874)	-1.632502 (0.1026)

According to the SVAR analysis results in Table 6, a change in interest rates creates an immediate and strong effect on the money supply. However, the expected effect on credit is not observed. The fact that the immediate effect of the M2 variable on credit is insignificant is a finding that is completely contrary to the traditional theoretical flow. However, this result shows that banks do not react instantly to the central bank's decisions on interest rate or money supply changes. On the other hand, it was found that interest rates, M2, and credit variables all have an instantaneous and significant effect on V2. This finding shows that the velocity of money circulation in the economy reacts instantly to any changes in financial markets. In particular, the fact that changes in credit affect V2 proves that spending is taking place. Finally, the lack of a significant effect of any variable on the growth rate reveals that monetary policy implementations do not affect real growth instantly. The conclusion drawn from all these findings is that, in the Turkish economy, while financial variables interact with each other, this interaction is not reflected instantly in real growth and credit volume.

In order to interpret the obtained results in more detail, structural variance decomposition and structural impulse-response analyses were performed.

Table 7. Model-I SVAR Model Variance Decomposition Results

INTEREST						
Period	S.E.	INTEREST	M2	CREDIT	V2	GROWTH RATE
1	0.121107	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.134286	89.42165	0.066214	9.387008	1.114361	0.010767
3	0.137773	85.46818	1.274046	10.42560	1.140395	1.691772
4	0.151032	71.25677	2.006595	16.04317	7.906347	2.787124
5	0.163038	65.25389	1.822568	13.82458	12.13448	6.964480
6	0.170810	62.39475	1.686738	15.27307	13.21183	7.433618
7	0.173198	60.70593	2.591579	15.72461	13.69453	7.283355
8	0.173909	60.33288	2.638960	15.86853	13.76382	7.395823
9	0.177924	59.01674	2.672783	15.16615	13.65014	9.494185
10	0.182527	57.27816	2.613617	15.16753	13.95961	10.98109
M2						
Period	S.E.	INTEREST	M2	CREDIT	V2	GROWTH RATE
1	0.018394	24.14488	75.85512	0.000000	0.000000	0.000000
2	0.019777	28.61029	65.61499	1.287395	3.075463	1.411864
3	0.020668	31.24064	61.37187	2.410844	3.679391	1.297264
4	0.021518	29.75735	56.94078	6.903630	5.200570	1.197665
5	0.023000	29.49398	53.69231	6.302188	4.656914	5.854606
6	0.023536	30.98870	51.30630	6.025516	4.450565	7.228924
7	0.024379	29.14611	48.40802	6.681651	4.570951	11.19327
8	0.025103	28.75950	46.01942	7.005714	5.750730	12.46464
9	0.025318	28.31102	45.72640	7.046888	6.511629	12.40407
10	0.025538	27.86358	45.03074	7.045622	7.817683	12.24237
CREDIT						
Period	S.E.	INTEREST	M2	CREDIT	V2	GROWTH RATE
1	1.095866	0.128322	1.506532	98.36515	0.000000	0.000000
2	1.184416	4.672278	1.298050	85.74189	0.432445	7.855337
3	1.266492	9.164534	1.167861	75.68684	3.944565	10.03620
4	1.508314	6.944503	11.98744	53.90793	9.455349	17.70478
5	1.571094	6.553276	11.52914	49.92655	9.683088	22.30795
6	1.577800	6.773180	11.46904	49.59066	9.654033	22.51309
7	1.610339	6.627500	11.18224	49.23087	11.07251	21.88688
8	1.620836	6.571283	11.39233	48.76459	11.43551	21.83628
9	1.623525	6.556874	11.37395	48.87697	11.40818	21.78403
10	1.650986	6.344863	11.28187	47.48428	12.04754	22.84144
V2						
Period	S.E.	INTEREST	M2	CREDIT	V2	GROWTH RATE
1	0.049686	29.69844	18.52706	5.509442	46.26507	0.000000
2	0.050606	30.22793	18.80942	5.324352	44.80390	0.834395
3	0.052339	32.02085	18.30582	5.550571	43.25210	0.870667
4	0.053885	30.25756	18.63324	7.121443	41.06883	2.918933
5	0.055996	28.60679	17.26739	9.252567	41.68487	3.188393
6	0.056091	28.51558	17.39531	9.241612	41.61663	3.230869
7	0.056612	29.10472	17.25025	9.072474	41.33022	3.242338
8	0.058254	28.58593	16.78793	9.608402	40.22618	4.791555
9	0.059107	29.10884	16.36699	9.444657	39.08275	5.996766
10	0.059353	28.89812	16.23388	9.522503	39.33491	6.010589
GROWTH RATE						
Period	S.E.	INTEREST	M2	CREDIT	V2	GROWTH RATE

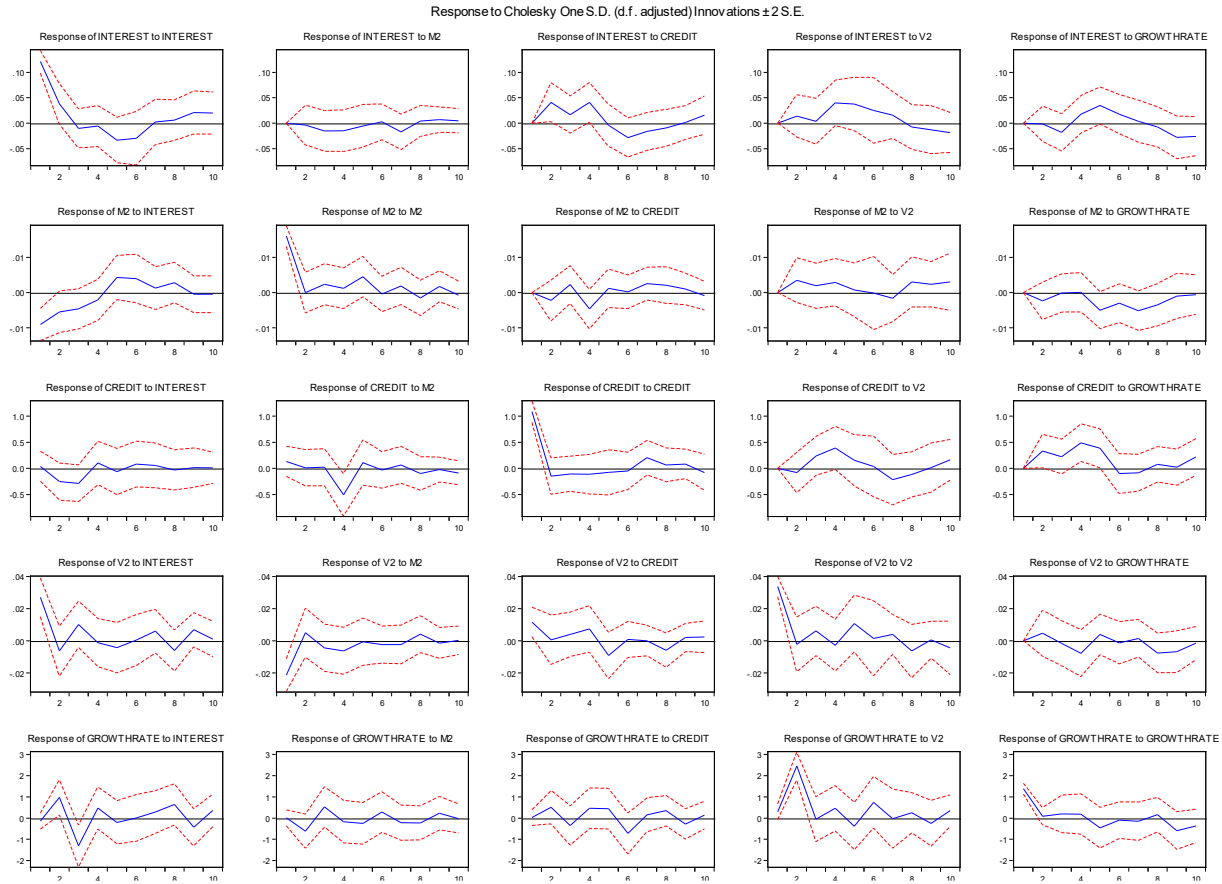
1	1.423949	0.935606	0.010504	0.030972	4.350153	94.67277
2	3.105815	10.00921	3.960912	2.728427	63.31978	19.98166
3	3.435259	22.73192	5.587512	3.254547	51.77397	16.65205
4	3.539133	23.21992	5.487822	4.804181	50.51650	15.97158
5	3.630443	22.37052	5.688601	6.074672	49.10331	16.76289
6	3.786672	20.56303	5.782169	9.203579	48.97763	15.47359
7	3.809615	20.87398	6.038390	9.254674	48.39382	15.43913
8	3.898355	22.68788	6.115797	9.637238	46.62855	14.93053
9	3.990611	22.80615	6.160389	9.691261	44.88673	16.45547
10	4.041702	23.04589	6.009186	9.566182	44.50490	16.87385

As seen in Table 6, although interest rates fully explain the changes in the first period, they follow a rapidly declining trend in the subsequent period. This indicates that interest rates are resilient to external shocks in the short term and that the effects of other variables are reflected with a delay. However, the fact that credits begin to increase their explanatory power from the third period onwards points to a delayed response. While the M2 variable largely explains the changes in the initial period, interest rates also have a 25% explanatory power. This indicates that the Central Bank's interest rate decisions have stable control over the money supply.

Looking at the source of changes in loans, it is seen that in the initial period, it largely stems from its own shocks. Over time, the decreasing self-explanatory power is replaced by the growth rate, V2, M2, and interest rates. The fact that the growth rate and M2 have a greater explanatory power than interest rates on loans proves that banks look at the direction of the economy rather than interest rate policy when determining loan supply. Looking at the changes in V2, it is seen that in addition to its low self-explanatory percentage in the initial period, interest rates and M2 together have a greater explanatory power. This finding indicates that monetary policy implementations first affect the velocity of money circulation, which in turn affects growth.

Finally, while changes in the growth rate are largely explained by itself in the initial period, its influence decreases significantly towards the final period. While the explanatory power of the V2 variable on growth remains quite high, the explanatory power of interest rates and credit is also increasing. This finding indicates that monetary policy directly affects growth and that the credit channel has a small but noticeable impact.

Previous analyses examined the relationship between credit, money supply, and growth. To clarify interactions, impulse-response analyses were conducted, with results shown in Figure 3.

Figure 3: SVAR Model-I Impulse-Response Analysis Results

As can be seen from Chart 2, the response of the interest rate variable to a one-unit standard deviation shock decreases rapidly until the third period, falling into negative territory. In the seventh period, it emerges from negative territory and becomes more stable. The M2 response is characterized by rapidly reaching positive territory in the fourth quarter and becoming stable towards the end of the quarter. Credit, on the other hand, started in positive territory but immediately turned negative. However, it returned to positive territory in the fourth quarter and remained stable until the end of the period. Looking at the V2 response, it shows quite sharp fluctuations in both negative and positive regions. The growth data also reacts sharply, fluctuating in both regions, similar to the V2 variable.

The response of interest rates to a one-unit standard deviation shock to the M2 variable is quite stable. Its self-response is to remain in the positive region, then rapidly decrease, and follow a volatile course until the end of the period. Although the credit variable exhibits a more stable appearance until the third period, it rapidly declines into negative territory. It rebounds from its lowest point in the fourth period and remains in positive territory until the seventh period. After that, it follows a more stable course in negative territory. The V2 variable, on the other hand, rapidly rises into positive territory and then generally exhibits a stable state in negative territory. The growth variable's response is quite volatile, reaching its peak in positive territory only in the third, sixth, and ninth periods.

In response to a one-unit standard deviation shock to the credit variable, the interest rate variable shows a fluctuating response in the positive region until the fifth period. Afterwards,

it moves into the negative region and returns to the positive region in the ninth period. The M2 variable exhibits a constant fluctuation in both negative and positive regions until the fifth period. While it remains stable in the positive region from the fifth to the final period, it turns negative in the last period. The reaction of this variable to itself, like the reactions of other variables, is one of rapid decline followed by a more stable state. The V2 variable begins its reaction in the positive region and ends it in the negative region in the fifth period. Although it exits the negative region in the sixth period, it returns again in the seventh period. In the ninth period, it moves into the positive region and becomes stable. Finally, the growth variable is seen to react in a constant fluctuating manner, with ups and downs in both negative and positive regions.

In response to a one-unit standard deviation shock to V2, the interest rate generally shows an upward trend for eight periods. After the ninth period, it falls into negative territory and follows a negative trend. The M2 variable shows a positive response until the fifth period, but then exhibits a decreasing negative response until the seventh period. After that, it remains in the positive region and becomes stationary. Looking at the response of credit, the trend starts in the negative region and continues until the sixth period. After that, the negative response turns positive in the ninth period. The V2 variable's response to itself is a rapid descent into the negative region, followed by sharp fluctuations. Finally, the growth rate rapidly reaches its peak in the positive region, then rapidly declines. After that, it generally remains in the positive region, exhibiting fluctuating responses.

The response of the interest rate variable to a one-unit standard deviation shock to the growth rate is in the negative region until the third period, first decreasing and then increasing. In the positive region, it remains there until the seventh period, after which it declines again and falls into the negative region. M2's response is almost stable until the fourth quarter, then fluctuates in the negative region until the ninth quarter. The credit variable follows a positive trend, first increasing and then decreasing, until the sixth period. After that, it falls into the negative region and remains stable until the seventh period. After the seventh period, it rises back into the positive region, exhibiting a stable appearance again. The V2 variable also reacts by fluctuating in both regions. Finally, looking at its own response, it remains relatively stable in the positive region until the fourth period, then falls into the negative region. After the seventh period, it rises back into the positive region, then falls back into the negative region shortly afterwards, exhibiting a slightly fluctuating trend.

When VAR-Granger Causality and SVAR Instantaneous Effect analyses are considered together, a significant time mismatch and structural lag are observed in the process by which financial variables affect the real sector. SVAR results demonstrate that changes in interest rates create a strong instantaneous interaction on the money supply (M2) and the velocity of money (V2), resulting in a rapid response in financial markets. However, the fact that this instantaneous effect is insignificant on credit volume and real growth shows that the banking system and the wheels of production respond with a delay to policy implementations. On the other hand, VAR-Granger findings reveal that the M2 and Credit variables only become the unidirectional cause of growth in the medium term, confirming that monetary policy requires a time period to affect the real economy. In summary, while the monetary authority's control over liquidity and spending appetite (V2) in Türkiye is instantaneous, the conversion of this

financial activity into credit expansion and economic growth occurs only after a certain time lag due to structural obstacles and delays in decision-making processes.

3.3. Model (II)- Econometric Model

Model-II covers 2006: Q1 to 2021: Q2 to assess the bank credit channel's effectiveness in detail. The study's variables are shown in Table 8.

Table 8: Model-II Data Set

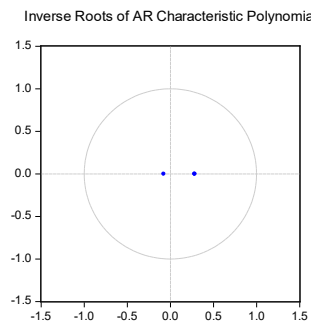
Variables	Symbol	Source
Total Credits (Million TL)	CREDIT	BRSA
Consumer Price Index (2003=100)	CPI	CBRT

As can be seen in Table 7, the variables of the second SVAR model analyzed are credit and inflation. The quarterly change rates of the resulting series were calculated and included in the analysis.

To obtain the total credit data, which is one of the variables of the model, TL and FC data of the entire banking sector were used. Quarterly total credit data were obtained from the Banking Regulation and Supervision Agency (BRSA)'s electronic database. The data were adjusted for exchange rate effects using the CBRT's dynamic method, converted to real terms with the CPI, and periodic change rates were calculated for the analysis. Another variable, CPI, was preferred as a percentage change from EVDS, the electronic database system of the CBRT. Monthly data were included in the analysis after being converted into quarterly data.

To determine whether a structural break existed in Model II, the Zivot-Andrews structural unit root test was performed. The structural unit root test did not detect any break period, and no unit roots were found in the variables. Then, in order to determine the stationarity levels of the specified variables, PP, ADF and KPSS tests were applied and it was determined that all variables were stationary³. After confirming variable stationarity with unit root tests, the optimal lag length for model estimation was set at 1. Subsequent overall stationarity analysis, shown in Figure 4, indicates that the system consists of stationary variables.

Figure 4: Model-II Inverse Roots of AR Polynomials



Following the stability check, autocorrelation and heteroscedasticity tests were conducted to assess structural issues, with results shown in Table 8.

³ See the Appendix for the results of all unit root tests.

Table 9: Model-II Autocorrelation (Portmanteau) and Heteroscedasticity (White) Test Results

Portmanteau Autocorrelation Test		
Delay Length	Df	Prob
2	4	0.4984
White Test		
Chi-sq	Df	Prob
15,83424	12	0.1989

As seen in Table 4, it was concluded that there was no autocorrelation among the error terms of the model for 4 lag levels and 0.05 significance levels. At the same time, it was investigated whether the variances of the error terms were constant for the whole model and it was determined that there was no heteroscedasticity problem in the model. As all significance tests indicated no issues, a Granger Causality Analysis and SVAR Structural analysis was conducted to examine the short-term causal relationships between the variables.

Table 10: Model-II Granger Causality Analysis Results (VAR Granger Causality/Block Exogeneity Wald Tests)

Dependent Variable: CREDIT			
Independent	Chi-square	df	Prob
CPI	3.244638	1	0.0717
Dependent Variable: CPI			
Independent	Chi-square	df	Prob
CREDIT	0.901264	1	0.3424

According to the VAR-Granger causality results in Table 10, at the 0.05 significance level, there is no causality from CREDIT to CPI, nor is there a unidirectional causality from CPI to CREDIT.

Table 11: Model-II SVAR Structural Analysis Results

	CREDIT	CPI
CREDIT	1	0
CPI	1.034243 (0.3010)	1

According to the SVAR results in Table 11, it also shows that a sudden increase in inflation does not create a significant pressure or incentive on bank loans within the same period. In other words, the inflation shock does not change the volume of credit 'immediately'. This indicates that in Türkiye, the cost or demand side effect of inflation on credit is delayed.

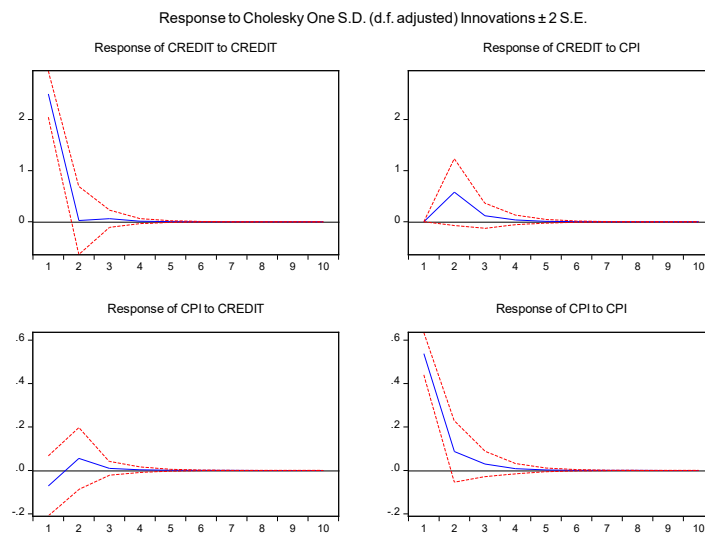
In order to interpret the obtained results in more detail, structural variance decomposition and structural impulse-response analyses were performed.

Table 12: Model-II SVAR Model Variance Decomposition Results

CREDIT			
Period	S.E.	CREDIT	CPI
1	2.498837	100.0000	0.000000
2	2.565675	94.86849	5.131515
3	2.569111	94.67062	5.329385
4	2.569408	94.65125	5.348750
5	2.569431	94.64980	5.350203
6	2.569433	94.64968	5.350320
7	2.569433	94.64967	5.350329
8	2.569433	94.64967	5.350330
9	2.569433	94.64967	5.350330
10	2.498837	100.0000	0.000000
CPI			
Period	S.E.	CREDIT	CPI
1	0.542423	1.723321	98.27668
2	0.552118	2.659179	97.34082
3	0.552994	2.681081	97.31892
4	0.553060	2.683738	97.31626
5	0.553065	2.683927	97.31607
6	0.553065	2.683943	97.31606
7	0.553065	2.683944	97.31606
8	0.553065	2.683944	97.31606
9	0.553065	2.683944	97.31606
10	0.553065	2.683944	97.31606

As shown in Table 12, changes in credit are entirely explained by the variable itself in the first period. Inflation, however, only explains it by about 5 percent. In other words, inflationary pressures or price increases do not significantly increase banks' credit supply. It appears that the biggest determinant of changes in inflation is the variable itself. The impact of credit expansion on inflation is quite low.

Impulse-response analyzes were carried out in order to support detailed interpretations of the variance decomposition. The results of these analyzes are presented in Figure 5.

Figure 5: SVAR Model-II Impulse-Response Analysis Results

The credit variable's response to a one-unit standard deviation shock is a rapid decline in the positive region followed by stabilization. Inflation's response, on the other hand, starts

in the negative region and then immediately moves into the positive region. It becomes stationary again in the third period. The credit's response to a one-unit standard deviation shock to inflation is in the positive region, initially increasing, then decreasing and stabilizing. Inflation's response to itself is also in the positive region, rapidly decreasing until the second period and then stabilizing.

Examining the results of both the VAR-Granger causality analysis and the SVAR analysis reveals that the interaction between the credit market and price stability in Türkiye is disconnected. In other words, controlling prices through the bank credit channel is quite difficult. Cost or demand-side effects can only be reflected in the system after a long-term delay.

4. CONCLUSION

This study examines the functioning of the bank credit channel, a monetary transmission mechanism in the Turkish economy, and the credit-inflation relationship, using data covering the period 2006Q1-2021Q2. Granger causality analysis and the SVAR model are used for both models. The analyses reveal how traditional monetary theories interact with of Türkiye unique dynamics and external shocks such as the Covid-19 pandemic. In this context, Model-I includes the variables of growth rate, interest rate, velocity of money circulation (V2), total credit volume, and M2 money supply; Model-II includes the variables of CREDIT and CPI to clearly reveal the main factor triggering credit within the framework of changes in GDP.

The results of Model-I show a significant deviation from traditional theoretical expectations in the reflections of monetary policy tools on the credit market in Türkiye. While changes in interest rates affect the money supply instantaneously, it appears that bank credits respond with a delay. The variance decomposition results show that the strongest variable affecting credit volume is the growth rate, indicating that in Türkiye, credit is driven more by economic activity and spending than by interest rates, meaning a 'demand-driven' structure predominates.

One of the most striking findings of the study is the critical role of V2 as a driving force for economic growth. According to the data, V2 explains growth to a high degree, creating a more dominant effect than money supply and interest rates. This indicates that in the Turkish economy, the velocity of money circulation, rather than the quantity of money, is the determining factor on GDP. A particular acceleration can be observed, caused by the expansionary credit campaigns implemented during the Covid-19 period. The immediate impact of credit shocks on V2 also confirms that credits included in the system do not remain idle but are quickly converted into spending and real growth.

During the Covid-19 period, credit expansion through public banks aimed at limiting the effects of the crisis accelerated credit flow periodically and pleased all sectors of the economy. The implemented active ratio and aggressive expansionary policies acted as a supply-side driver, leading to high growth rates and providing temporary improvement. However, the measures taken also accelerated the lag period identified in the analysis for a while.

The findings of Model II show that the impact of credit volume on inflation is limited, and inflation has a more self-focused tendency. This reflects the structural reality of the

Turkish economy rather than external shocks. Therefore, the credit expansion experienced during the pandemic did not excessively alter inflation. It supported economic growth by spreading over the medium and long term.

The results obtained from the analysis are similar to the findings of studies by Kar and Pentecost (2000), Ceylan and Durkaya (2010), Kandır et al. (2007), Sunde (2013) and Demirci (2017), Murthy and Samantaraya (2014), Tunalı and Onuk (2017), and İsmail et al. (2019). However, a review of the literature reveals that many variables, not just credit, are analyzed for financial development indicators. In this study, since the effectiveness of the bank credit channel mechanism is investigated, the variable choices were primarily made in relation to the functioning of this mechanism. Therefore, this finding partially supports the demand-following hypothesis.

The findings show that V2, which is largely influenced by bank credit, is the main driving force in Türkiye's economic growth process. The developments and experiences during the Covid-19 period have also concretely demonstrated that credit can become a growth lever. Therefore, it is crucial for the Central Bank to implement the right growth policies at the right time. Monetary policies should focus not only on the money supply but also on reforms that can improve the velocity of money circulation and make the credit channel more efficient.

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Appendix

Appendix A: Model-I Unit Root Tests (ZA, PP, ADF, KPSS)

Appendix A1: Zivot-Andrews Unit Root Test

Variables	Constant	Constant and Trend
GROWTH RATE	-10.33567	-11.17550
M2	-7.950965	-7.882242
INTEREST	-5.637905	-5.726410
CREDIT	-7.897587	-8.404213
V2	-9.899991	-10.50558

Note: Values in parentheses indicate the number of lags selected by the Akaike Information Criterion. The critical values for the models are taken from Zivot and Andrews (1992): -5.34 and -4.93 for Model A at the 1% and 5% significance levels, respectively; and -5.57 and -5.08 for Model C at the 1% and 5% significance levels, respectively.

Appendix A2: Philips-Perron (PP) Unit Root Test

Variables	Constant	Constant and Trend	Without Constant and Trend
GROWTH RATE	-9.8668***	-9.8152***	-8.3836***
M2	-6.3939***	-6.180***	-2.1120**
INTEREST	-5.2415***	-5.2328***	-5.2470***
CREDIT	-6.8579**	-6.9724***	-6.8830***
V2	-8.6744***	-9.7480***	-8.6739**

Note: '**' indicates a significance level of 0.10, '***' 0.05, and '****' 0.01.

Appendix A3: Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Constant	Constant and Trend	Without Constant and Trend
GROWTH RATE	-9.8662***	-9.8126***	-8.3656***
M2	-6.3367***	-6.3540***	-1.2749
INTEREST	-5.2009***	-5.1987***	-5.2087***
CREDIT	-6.8541***	-6.9652***	-6.8792***
V2	-8.7205***	-9.7480***	-8.7185***

Note: '**' indicates a significance level of 0.10, '***' 0.05, and '****' 0.01.

Appendix A4: KPSS Unit Root Test

Variables	Constant	Constant and Trend
GROWTH RATE	0.0484***	0.5062***
M2	0.2504***	0.1535*
INTEREST	0.1120***	0.0426***
CREDIT	0.2653***	0.1152***
V2	0.5461*	0.0380***

Note: '**' indicates a significance level of 0.10, '***' 0.05, and '****' 0.01.

Appendix B: Model-II Unit Root Tests ZA, PP, ADF, KPSS)

Appendix B1: Zivot-Andrews Unit Root Test

Variables	Constant	Constant and Trend
CREDIT	-7.897587	-8.404213
CPI	-7.456180	-7.558981

Note: Values in parentheses indicate the number of lags selected by the Akaike Information Criterion. The critical values for the models are taken from Zivot and Andrews (1992): -5.34 and -4.93 for Model A at the 1% and 5% significance levels, respectively; and -5.57 and -5.08 for Model C at the 1% and 5% significance levels, respectively.

Appendix B2: Philips-Perron (PP) Unit Root Test

Variables	Constant	Constant and Trend	Without Constant and Trend
CREDIT	-7.4021***	-8.1956***	-7.4622***
CPI	-6.5317***	-7.1187***	-2.7809***

Note: '*' indicates a significance level of 0.10, '**' 0.05, and '***' 0.01.

Appendix B3: Augmented Dickey-Fuller Unit Root Test

Variables	Constant	Constant and Trend	Without Constant and Trend
CREDIT	-7.4021***	-8.1060***	-7.4622***
CPI	-6.5157***	-7.1491***	-0.9395

Note: '*' indicates a significance level of 0.10, '**' 0.05, and '***' 0.01.